Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] What is claimed is:

1. A method for achieving frame synchronization of a received signal, the received signal being divided into frames with each frame comprising a plurality of slots, the method comprising:

correlating the received signal with a plurality of predetermined correlators to obtain a plurality of frame synchronization correlation results;

coherently combining frame synchronization correlation results with a slot synchronization phase, the slot synchronization phase determined by correlating the received signal with a slot synchronization sequence, when a test phase difference is less than a threshold phase difference;

coherently combining frame synchronization correlation results with a linear combination of slot synchronization phases when the test phase difference is greater than or equal to the threshold phase difference; and

determining a frame boundary of the received signal based on the coherent combination results.

[c2] 2. The method of claim 1 wherein the linear combination

is determined by:

determining a difference between a current slot synchronization phase and at least a previous slot synchronization phase; and

averaging slot synchronization phase differences.

[c3] 3. The method of claim 2 wherein a frame comprises 15 consecutive slots, and the average comprises 14 slot synchronization phase differences from the 15 consecutive slots.

[c4] 4. The method of claim 1 wherein the test phase difference is a mean square error (MSE) phase difference of a predetermined number of slot synchronization phases.

[c5] 5. The method of claim 1 wherein the threshold phase difference is selected referencing an expected signal to noise ratio (SNR) range of the received signal; such that the coherent combination of frame synchronization correlation results is with the slot synchronization phase when the SNR is in a high range, and with the linear combination of slot synchronization phases when the SNR is in a low range.

[c6] 6. The method of claim 1 wherein determining the frame boundary comprises:

accumulating the coherent combination results over a

predetermined number of slots; and
selecting a maximum value of the coherent combination results to determine the frame boundary and a corresponding code group.

[c7] 7. The method of claim 1 wherein 16 predetermined correlators are provided, the received signal including one of 64 combinations of the 16 predetermined correlators in a set of 15 symbols per frame at one symbol per slot.

[c8] 8. A wireless device for performing the method of claim 1.

[c9] 9. A wireless device comprising:
a receiver for receiving a signal divided into frames with each frame comprising a plurality of slots;
a first stage for receiving slot synchronization phases of the received signal;
a plurality of correlators for outputting a plurality of frame synchronization correlation results of the received signal;
a combiner for coherently combining the frame synchronization correlation results with a slot synchronization phase when a test phase difference is less than a threshold phase difference or a linear combination of slot synchronization phases when the test phase difference is greater than or equal to the threshold phase difference;

and

a selection unit for selecting a frame boundary based on the output of the combiner.

[c10] 10. The wireless device of claim 9 wherein the combiner includes a simple average processor that calculates the linear combination by:

determining a difference between a current slot synchronization phase and at least a previous slot synchronization phase; and

averaging slot synchronization phase differences.

[c11] 11. The wireless device of claim 10 wherein a frame comprises 15 consecutive slots, and the average calculated by the simple average processor comprises 14 slot synchronization phase differences from the 15 consecutive slots.

[c12] 12. The wireless device of claim 9 wherein the combiner includes a simple average processor for calculating the test phase difference as a mean square error (MSE) phase difference of a predetermined number of slot synchronization phases.

[c13] 13. The wireless device of claim 9 wherein the combiner is capable of setting the threshold phase difference referencing an expected signal to noise ratio (SNR) range of

the received signal; such that the coherent combination of frame synchronization correlation results is with the slot synchronization phase when the SNR is in a high range, and with the linear combination of slot synchronization phases when the SNR is in a low range.

[c14] 14. The wireless device of claim 9 wherein the selection unit comprises a plurality of accumulators for accumulating output of the combiner over a predetermined number of slots.

[c15] 15. The wireless device of claim 9 wherein the combiner includes 16 correlators each having a predetermined correlation value, the received signal including one of 64 combinations of the 16 predetermined correlation values in a set of 15 symbols per frame at one symbol per slot.